

# Penile strangulation by different objects and its removal by the modified string method: Management of four cases with review of literature

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## Abstract

Penile strangulation is a challenging clinical situation and usually requires prompt treatment. Penile strangulation by a nonmetallic or thin metallic ring is easily overcome by severing/cutting the object; however, a heavy and long metal ring causing penile strangulation is not only difficult to sever but also it may worsen the scenario if removal is tried with inappropriate method. Here, we report four cases of penile strangulation by different objects which were successfully removed by aspiration and string method. We found that instead of using heavy cutting instruments and other surgical methods, string and aspiration technique is much better.

**Keywords:** Foreign body, penile ischemia, penile strangulation, string method

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## INTRODUCTION

Penile strangulation is an unusual clinical condition that was first reported in 1755 by Gauthier.<sup>[1]</sup> It is a type of a compartment syndrome, which requires urgent treatment to maintain vascularity of the corporal bodies. Metallic or nonmetallic objects are the most common cause of penile strangulation.<sup>[2]</sup> In adults, strangulation injuries that require medical treatment can be caused by a variety of objects, typically used for the purpose of sexual gratification, extending the time of an erection. Urgent treatment is required, as potential delays may lead to permanent and severe damage, including penile amputation, sepsis, and even death. Herein, we report four cases of penile strangulation due to different objects and their removal by modified string technique, i.e., with the use of aspiration method simultaneously.

## CASE DESCRIPTION

A 42-year-old unmarried man presented to our emergency outpatient department with a strangulated penis of 6-h duration. After placing a piece of metallic plumbing pipe, he was unable to remove it from his engorged penile shaft after autostimulation. He was having severe pain in the penis and was unable to void. Physical examination showed a thick metallic ring, 4 cm in length stuck at the base of the penis. The whole of the penis distal to metallic object was grossly swollen and congested [Figure 1]. In the emergency room, removal of the ring was initially attempted using lubricants but was unsuccessful due to the long pipe and grossly engorged penis. The patient was admitted and immediately taken to emergency operation

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theater. Under spinal anesthesia, we used modified string and aspiration method and were able to remove the metallic pipe within 20 min of time [Figure 2]. Following removal of the ring, it was noticed that there was loss of epidermis at the site of impaction. He was discharged on postoperative day 2 with an advice of regular dressing, oral anti-inflammatory drug, and antibiotics. Ten-day follow-up showed a partial-thickness skin loss at the site of impaction [Figure 3]. There was no loss of distal penile sensation and no voiding difficulty, and he could attain a normal erection. He is waiting for a split-thickness skin grafting by the plastic surgeons.

### Procedure

With the help of two wide-bore (16-gauge) needles, distal corpora cavernosa was punctured and blood aspirated [Figure 2a]. Manual compression of the distal penis helped in aspiration/partial decompression of the

penis. After proper lubrication, a 10 Fr Foley catheter could be negotiated between the metallic pipe and the penis and passed from the root of the penis toward the glans [Figure 2b]. Distal (glanular) end of the catheter was circumferentially coiled over the penile shaft, in clockwise direction, compressing the shaft to a diameter just lesser than the inner diameter of the ring [Figure 2c]. The metallic pipe was glided over the catheter-covered compressed penis, distally toward the glans for approximately 4 cm. The proximal end of the Foley catheter was unwinded, which helped pushing the pipe distally [Figure 2d]. The same procedure was repeated three times before the pipe could be glided past the glans completely [Figure 2e]. Normally, this procedure is best done with the help of a vessel loop, but due to its unavailability in the emergency, we had to use a Foley catheter.

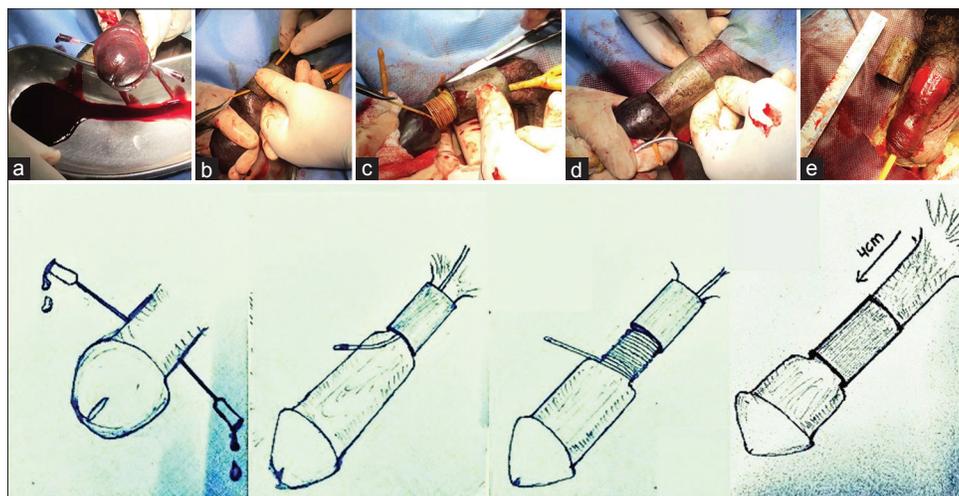
### DISCUSSION

Penile strangulation is a rare clinical entity which may lead to serious complications if not treated promptly and judiciously. The reasons for applying foreign bodies to the external genitals are varied and depend on the patient's age group. In middle-aged and elderly men, the leading cause of application of foreign bodies is to increase sexual performance or because of autoerotic intentions, while masturbation and sexual curiosity are the leading causes in male adolescents.<sup>[3]</sup> In infants and children, the foreign body is usually a string, thread, rubber band, or hair tied around the penis.<sup>[3]</sup> In some patients, different concomitant psychiatric abnormalities were registered.<sup>[4]</sup>

Although usually acute, cases of chronic strangulation and acute cases lasting up to 1 month have been reported.<sup>[1,5]</sup>



**Figure 1:** The index patient with a metal plumbing pipe strangulation



**Figure 2:** Steps of modified string method. (a) Corporal aspiration with wide bore needles for decompression. (b) Passing the string between penis and the "ring." (c) Tight winding of the string around penis. (d) Distal advancement of the "ring" followed by unwinding of the string. (e) The removed "ring"

Usually, the patients report after few hours of strangulation because of associated social stigmata. They attend the emergency room once all the home remedies to remove the foreign body fail, and local pain starts appearing. This delay has clinical implications in the form of long-term outcome. Because the vasculature of the penis is compressed, a variety of complications can result from strangulation injuries, depending on whether the veins, arteries, or both are compressed. It can lead to mild, reversible vascular obstruction, lymphedema, loss of penile sensation, ischemic skin necrosis/ulceration, urethrocutaneous fistula, urethral injury, gangrene, and autoamputation of penis and sepsis.<sup>[1]</sup> In 1991, Bhat *et al.* presented an excellent original classification for penile incarceration composed of five grades as follows:<sup>[6]</sup>

- Grade I: Distal edema only
- Grade II: Distal edema, skin and urethral trauma, corpus spongiosum compression, decreased penile sensation
- Grade III: Skin and urethral trauma, no distal sensation
- Grade IV: Separation of corpus spongiosum, urethral fistula, corpus cavernosum compression, no distal sensation
- Grade V: Gangrene, necrosis, or distal penile amputation.

In one of the largest studies on penile strangulation by hair, Harouchi *et al.* described four grades of injury ranging from superficial skin loss (Grade I) to loss of glans (Grade IV).<sup>[7]</sup> Silberstein *et al.*<sup>[8]</sup> developed a grading system with two broad categories as low- and high-grade penile injuries. High-grade injuries are defined as injuries that are likely to require second surgical intervention after removal of the strangulating agent. Based on these classifications, it is possible to evaluate the severity of complications that occurred after incarceration as well as to determine the treatment strategy. Three patients presented here had low-grade injuries, and no surgical intervention was performed after removal of the rings. One patient had high-grade injury with partial-thickness skin loss who was referred to plastic surgeon for skin grafting. One patient

had persistent distal penile numbness with less sexual satisfaction, but none of them had any erectile dysfunction. All the patients underwent a uroflowmetry at 3- and 6-month postintervention irrespective of any voiding difficulty. None of these patients had any delayed development of urethral stricture disease or erectile dysfunction at mean follow-up of 16 months (range: 4–24 months). Table 1 is showing details of patients who presented with penile strangulation and their management and outcome.

The treatment of penile strangulation is prompt decompression of the constricted penis to facilitate free blood flow and micturition. Various techniques have been described in the literature: aspiration, string method, combination of aspiration and string method string,<sup>[2]</sup> cutting devices,<sup>[9,10]</sup> and deglove operation.<sup>[11]</sup> Cutting is the most common method described. Cutting tools used included an iron saw, orthopedic equipment, and a high-speed diamond-tipped dental drill.<sup>[12]</sup> The technique chosen is influenced by the characteristics of the constricting device and grade of trauma and the resources available.<sup>[8]</sup> Nonmetallic rings can usually be removed simply by cutting the constricting object. However, metallic constricting rings placed around the penis present a challenge to urologists, especially when they are long and thick. Availability of gadgets, sometimes at odd hours, and the unavoidable delay of its arrangement in a case which has already presented late is a major issue in management and ultimately may worsen prognosis. Even when available, the use of various cutting instruments took long time, and unfortunate reports of iatrogenic injury are also high.<sup>[13]</sup>

Regarding techniques which use string, the resource needed is very minimal. A vessel loop, umbilical tape, infant feeding tube, a small-sized Foley catheter (up to 10 Fr), or even a silk tie can be used as the “string” [Figure 6]. Vahasarja *et al.* first described the string method on two patients.<sup>[14]</sup> Noh *et al.* reported a “modified” string method in dealing with penile strangulation, involving additional glandular puncture, making it easier and more rapid than

**Table 1: Patients of penile strangulation with different objects, their management, and the outcome**

Case	Age (years)	Strangulating object	Duration of strangulation (h)	Type of strangulation Bhat type/Silberstein grade	Method of removal	Follow-up (duration)/complication
1	42	Metallic plumbing pipe	6	Type II high grade	Aspiration and string method	4 months/partial thickness skin loss at impaction site
2	23	Metallic ring	3	Type I low grade	String method only	24 months/nil [Figure 4]
3	46	Thick glass bottle	5	Type I low grade	Bottle broken, bottleneck removed by aspiration and string method	24 months/nil
4	19	Metallic ring	7	Type II low grade	Aspiration and string method	12 months/loss of epidermis managed conservatively. Persistent distal penile numbness [Figure 5]



**Figure 3:** Follow-up: partial-thickness skin loss



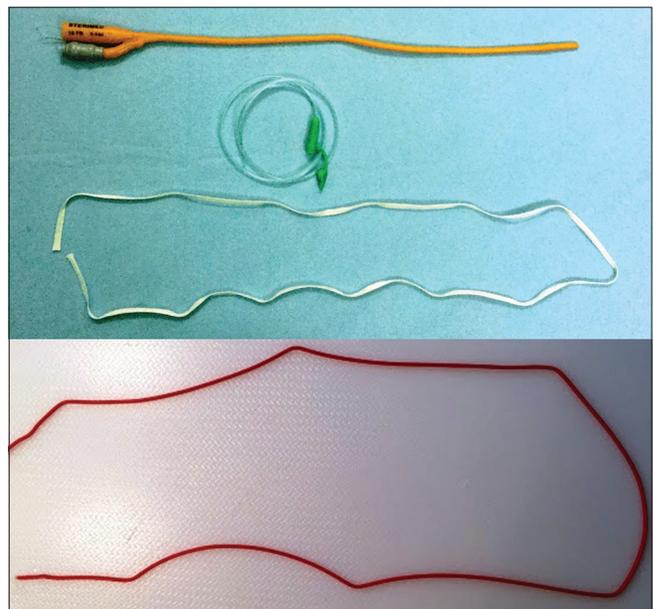
**Figure 5:** Fourth patient with "thin ring" strangulation

the conventional string method.<sup>[2]</sup> The glandular puncture is somewhat useful for drainage of ischemic blood in penile strangulation. However, if there is not only congestion of the corpus spongiosum and the glans penis but also the edema of the foreskin, foreskin puncture and glandular puncture should be performed at the same time. If there is only edema of the foreskin without blood stasis in the penis glans, foreskin puncture is enough.<sup>[15]</sup>

In our experience, string method with aspiration of blood from corpora is better than the use of various cutting devices. These two methods are particularly useful together, as the string technique provides sequential compression and aspiration allows the congested blood a method of exit. Instead of glandular puncture described previously, we did bilateral corporal aspiration, preventing the possibility of formation of a corporoglanular shunt leading to erectile dysfunction in the future. We successfully removed various objects by this method. With rapid intervention and removal of the foreign body, most patients do extremely well and need no further intervention. The outcome, even



**Figure 4:** Second patient with the ring. Note intact skin after removal



**Figure 6:** The "resource" needed: small caliber Foley catheter, infant feeding tube, umbilical tape, vessel loop, or even a silk tie can be used as the "string"

after long periods of penile strangulation, is often good. In one series only, 13% of patients had lasting complications,<sup>[8]</sup> whereas in another, up to 30% had serious complications, such as urethracutaneous fistula<sup>[16]</sup> or penile amputation.<sup>[17]</sup> If a Grade III/IV or high-grade injury is suspected, then additional investigations should be done to rule out urethral injury, and the patient should be followed up further for the development of skin necrosis, urethracutaneous fistula, or sexual dysfunction.

## CONCLUSION

Penile strangulation by a constricting device is a urologic emergency with potentially severe clinical consequences. Removal of such devices can be challenging and often requires resourcefulness and a multidisciplinary approach. Clinicians should use the least traumatic technique to remove a constriction device from the genitals as soon

as possible after incarceration. String method along with aspiration of blood from the penis is an easy yet very effective method for the treatment of penile strangulation. In comparison to other methods of object removal, it needs least resources and appears to be safer than other methods.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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### Conflicts of interest

There are no conflicts of interest.

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